**COMP9444 Neural Networks and Deep Learning**

## Quiz 8 (Weeks 9-12)

This is an optional quiz to test your understanding of the material from Weeks 9 to 12.

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1. In the context of Deep Q-Learning, explain the following:

    a. Experience Replay
    b. Double Q-Learning

2. Briefly describe the Evolutionary Computation algorithms that were applied to the following domains:

    a. Backgammon, Simulated Hockey
    b. Atari Pong, MuJoCo humanoid walking

3. What is the Energy function for these architectures:

    a. Boltzmann Machine
    b. Restricted Boltzmann Machine

    Remember to define any variables you use.

4. The Variational Auto-Encoder is trained to maximize

    $\mathbf{E}_{z \sim q_\varphi(z \mid x^{(l)})} [\log p_\theta(x^{(l)} \mid z)] \; - \; D_{KL}(q_\varphi(z \mid x^{(l)}) \,||\, p(z))$

    Briefly state what each of these two terms aims to achieve.

5. Generative Adversarial Networks make use of a two-player zero-sum game between a Generator $G_\theta$ and a Discriminator $D_\psi$, to compute

    $\min_\theta \max_\psi (V(G_\theta, D_\psi))$

    Give the formula for $V(G_\theta, D_\psi)$.

6. In the context of GANs, briefly explain what is meant by *mode collapse*, and list three different methods for avoiding it.

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Make sure you try answering the Questions yourself, before checking the Sample Answers